The HELCOM's toolbox of bycatch mitigation measures

Marine Mammal And Bird Bycatch In The Baltic Sea

Turning Knowledge Into Action

Hel, 13-14 November 2025

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Context

S43

Reduce the negative impacts of fishing activities on the marine ecosystem and to this end, support the development of fisheries management, including technical measures to minimize unwanted by-catch of fish, birds and marine mammals and achieve the close to zero target for by-catch rates of relevant species by 2024, especially the Baltic proper population of harbour porpoise by 2022.

Cross-reference to actions in other segments

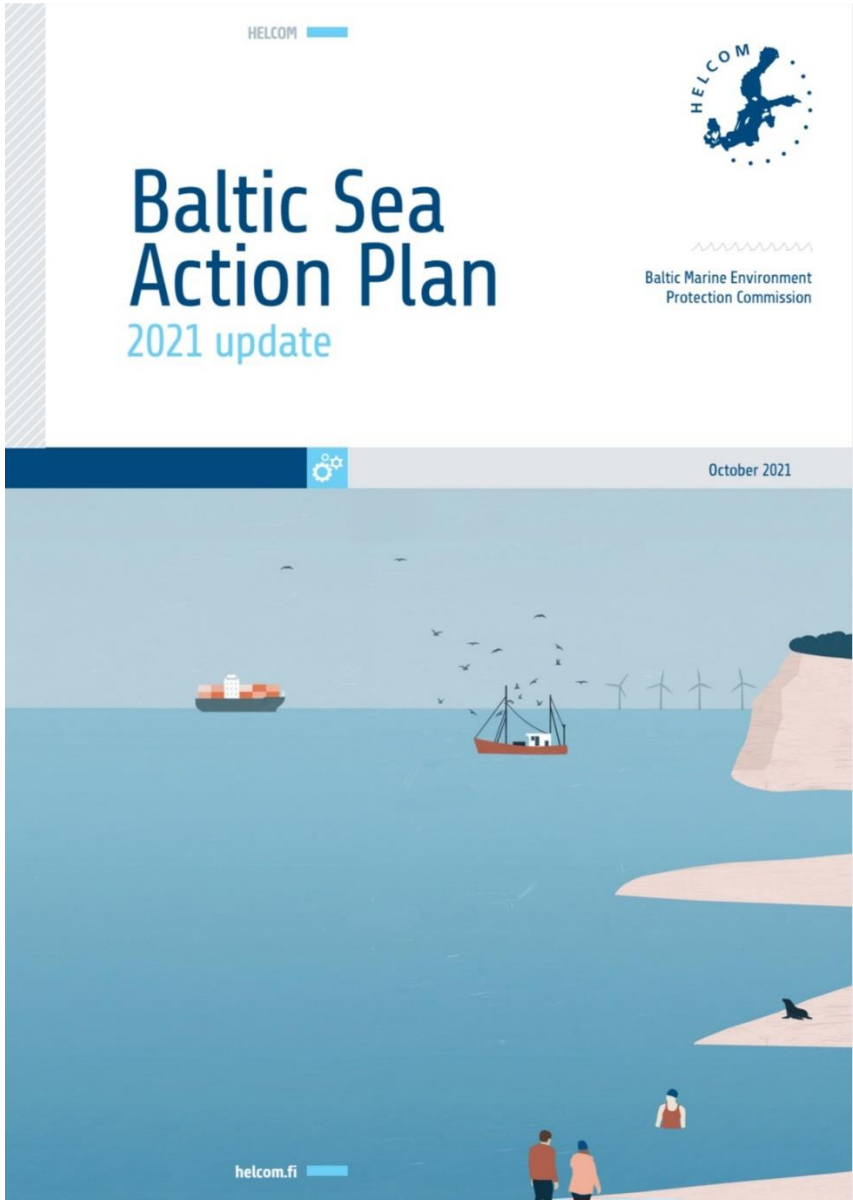
B8

S47

Continually test, promote, and introduce new technical and operational by-catch mitigation measures such as alternative and seal safe gears in cooperation with competent authorities with the aim to, as appropriate, replace fishing gear proven to be problematic with respect to by-catch, with evaluation of measures every five years starting in 2023, and regularly update the HELCOM questionnaire on trials of alternative fishing gears and fishing techniques.

Cross-reference to actions in other segments

B3 B5 B8



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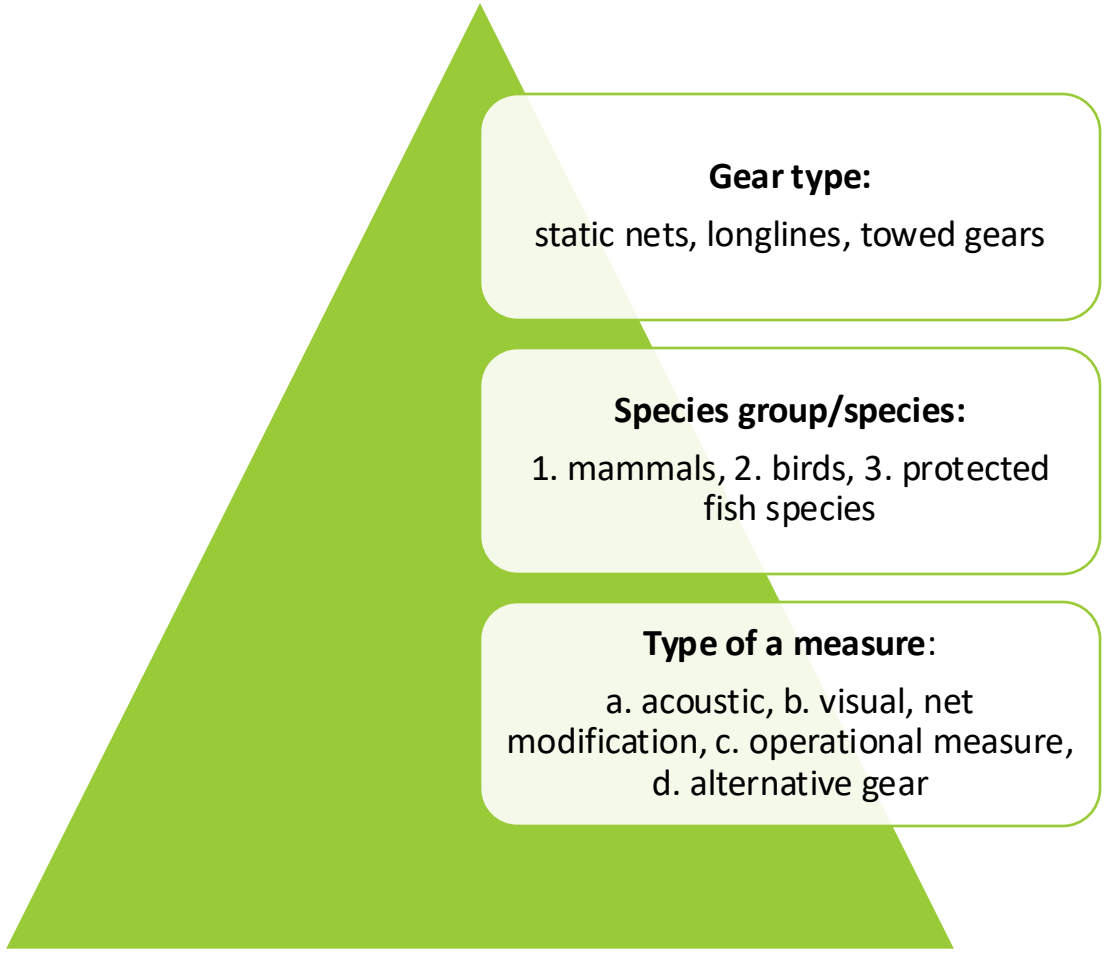

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Categories used to assess each measure
(e.g., in terms of mitigation efficiency) and the effectiveness of the measure in the Baltic Sea

1	Reduced bycatch of species of concern (proven in the area of concern)
2	Reduced bycatch of species of concern (proven elsewhere)
3	Reduced bycatch of animal group of concern, not proven for species of concern
4	No bycatch reduction in species of concern, but reduced bycatch of other fauna outside animal group of concern
5	Testing in progress, or results not conclusive
6	No reduction in bycatch

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- Acoustic deterrents – harbour porpoise

Mitigation measure	Function	Testing	Findings	Additional benefits	Limitations/considerations	Source	Available for use	Mitigation effectiveness Status*
Technical measures - active acoustic devices **General limitations:** *Pingers are not 100% effective, meaning that bycatch can occur even if pingers are used. It requires maintenance and some attention with respect to spacing to reach a high effectiveness. If not maintained properly, bycatch rates could even increase. Background noise may have an impact on the effectiveness of pingers (depending on the frequency and intensity). Some Navies object the use of pingers due to possible interference with their sonars. Furthermore, introduction of additional background noise and some degree of habitat exclusion must be expected as pingers are designed to deter porpoises from their vicinity. In the ASCOBANS Jastarnia Plan, pingers have been considered as interim measures until viable altemative gears are available.*								
1. Experimental (LU-1) 40-120kHz pingers	deterrent device	test in Danish cod fishery	more than a 90% reduction in porpoise bycatch	would allow continuation of static net fishery under certain circumstances	This experiment (conducted in 1997) formed part of the basis for the first EU wide pinger regulations. Adding noise to the marine environment. May work as a dinner bell for seals. Interactions with military (sonars) have been raised as an issue.	Larsen & Eigaard 2014	**NO**	**1**
2. **Fishtek Porpoise & dolphin deterrent pinger (50-120kHz)** **"banana pinger"**	deterrent device	in Cornwall UK: study using acoustic click detectors Baltic Sea: study using acoustic click detectors in lumpfish and cod fisheries (Björklund Aksoy 2020) Western Norway test in various fisheries (Moan & Bjørge 2023)	acoustic detection probability close to an active pinger was reduced by 37% indicating a reduced bycatch risk reduced acoustic activity near pinger indicates reduced bycatch risk, bycatch number too low for analysis banana pingers and Future Oceans 70 kHz pingers (data pooled in study) significantly reduced porpoise bycatch in mixed, cod, and monkfish fisheries, no significant difference in saithe fishery	would allow continuation of static net fishery under certain circumstances	Reduced echolocation at the nets might indicate less animals near the net or decreased echolocation activity by individuals. In the latter case it could increase bycatch risk. Adding noise to the marine environment. No increased seal depredation in the Baltic Sea (Carlén & Cosentino 2023). Interactions with military (sonars) have been raised as an issue. An unpublished test in a fishery in Iceland was not able to reproduce the positive results from other areas (ICES 2021).	Omeyer et al. 2020 Björklund Aksoy 2020 ICES 2021 Moan & Bjørge 2023 Carlén & Cosentino 2023 HELCOM Questionnaire	**YES**	**2**

Acoustic deterrents -

Function: to deter porpoises from the net, or warn them

- **Experimental (LU-1) 40-120kHz pingers**
- **Fishtek Porpoise & dolphin deterrent pinger (50-120kHz)**
- **Banana pinger 145dB 20–160 kHz**
- **Banana pinger 155dB**
- **Future Oceans pinger 70 kHz, 10 kHz**
- **Porpoise-PAL (PorpoiseALert) 133 kHz**
- **Wideband-PAL 10 - 130 kHz, source level > 145 dB**
- **PAL 10 kHz tonal**
- **Experimental (PICE) 20-160 kHz pinger**
- **Future Oceans (Netguard) dolphin pinger- 60-120 kHz**
- **Dukane Netmark 1000 105-139 kHz**
- **Lien 3 kHz 122-125 dB**
- **Dukane Netmark 1000 139-145 kHz**
- **Aquatec Aquamark 100 136-145 kHz**
- **DDD03 L 2-500 kHz**

Hel Marine Station

Reduced bycatch of species of concern (proven in the area of concern)

Reduced bycatch of species of concern (proven elsewhere)

Testing in progress, or results not conclusive

No reduction in bycatch

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- Net modifications (static nets) –harbour porpoise

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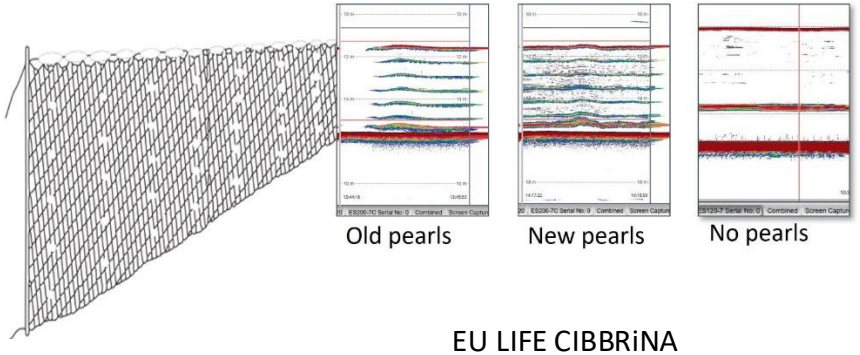
Net modifications								
22. Pearl Nets	increase acoustic detectability of the fishing net to odontocete echolocation	Black Sea: pilot study using turbot nets Iceland: tested within STELLA II and CIBBRiNA project echolocation recordings at nets	Angle-dependent increased acoustic reflectivity bycatch reduction in pearl net pilot study was not significant due to low effort increase in the number of buzz sequences around the net with pearls suggests that the net is investigated to a higher degree by the harbour porpoises than a standard net.	Would allow continuation of static net fishery under certain circumstances	promising mitigation method for odontocetes, not useful for species not echolocating (e.g., seals, birds) more tests on effectiveness in bycatch reduction are needed, similar catch effectiveness with gillnets has been proven	Kratzer et al. 2021 (Kratzer et al. 2020) Gustafson 2020 Kindt-Larsen et al., 2024 EU LIFE CIBBRiNA https://cibbrina.eu HELCOM questionnaire	**NO** but easy to adapt for wide use in case of high effectiveness	**5**

Net modifications – harbour porpoise

Function: to increase „the visibility” of the net for harbour porpoise.

Pearl nets

Barium Sulfate nets



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Testing in progress, or results not conclusive

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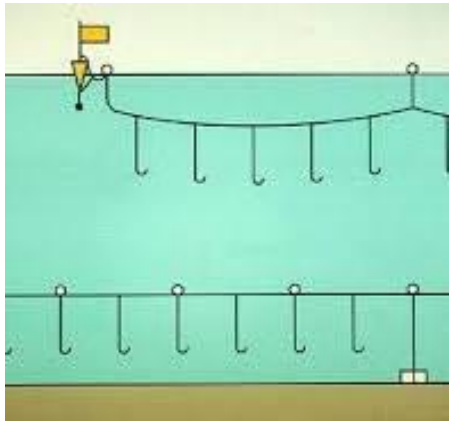
- Alternative gears – harbour porpoise

Alternative gears								
17. Longlines as alternative to gillnets	It is supposed that longlines pose a minimum risk of entanglement to porpoises compared to gillnets	German coastal waters (Schleswig-Holstein) used in commercial fisheries	it can be an effective way to catch fish and avoid using gillnets	very good quality of the catch, no bycatch of harbour porpoise observed	do not in general reduce bycatch of birds, depredation from seals is highly likely largely dependent on the type of hooks, lines, bait, fishing depth, fishing practices, and a variety of biotic and abiotic factors. All of these factors will affect fishing success and whether it can be commercially viable. low catch efficiency in the Baltic Sea, the largest catches were observed from December to April while the lowest from May to July	NABU Detloff & Koschinski, 2017 HELCOM questionnaire ICES Technical Service advice, 2024	**YES** longlines are widely used and are available on the market	**5**
18. Jigging machines/ **angling** as alternative gears to gillnets	It is supposed that angling poses a minimum risk of entanglement to porpoises compared to gillnets	German coastal waters (Schleswig-Holstein) Polish coastal waters (Gulf of Gdansk)	fishing efficiency of the gear is low, no bycatch observed		a number of factors will affect fishing success and whether it can be commercially viable for the gear to work properly an abundant cod-stock would be needed which is not currently the case	NABU Detloff & Koschinski, 2017 HELCOM questionnaire EU LIFE CIBBRiNA www.cibbrina.eu		**5**



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Alternative gears – harbour porpoise

Function: to reduce the risk of entanglement

Longlines as an alternative to gillnets

Jigging machines/angling as alternative gears to gillnets

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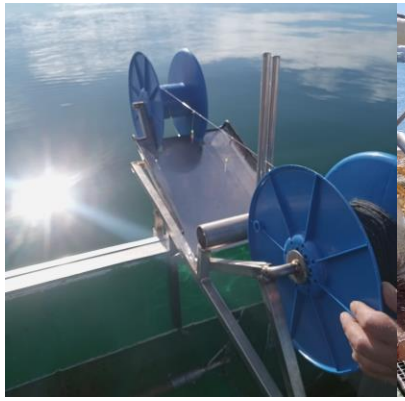
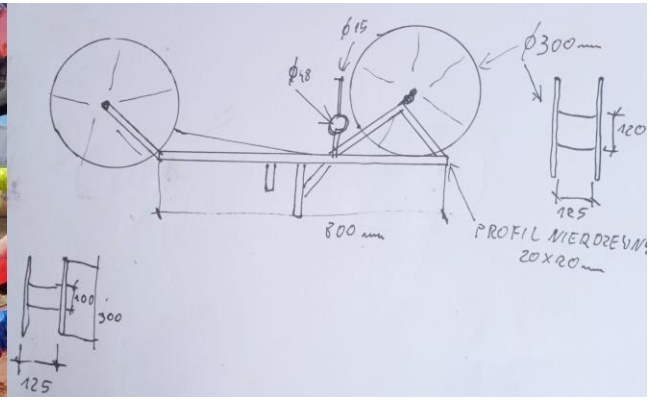


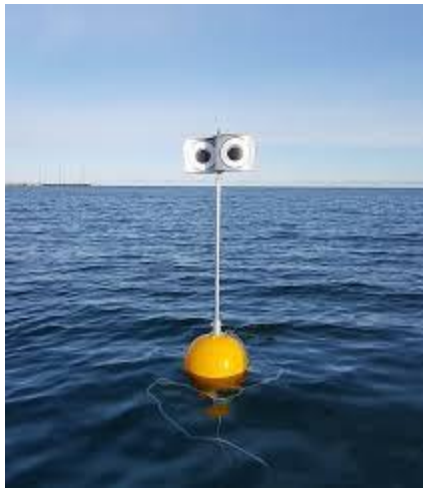


Testing in progress, or results not conclusive

BSAP Action S43: Toolbox for bycatch mitigation

- Technical measures & net modification (static nets) – marine birds

Mitigation	Function	Testing	Findings	Additional benefits	Limitations/considerations	Source	Availability for use	Mitigation effectiveness Status*
Technical measures								
24. Lights on the net (net illumination)	increase visibility of the net for non-target species	Mexico's Baja California Peruvian marine waters Baltic Sea	significant decrease in elasmobranch bycatch (95%) no significant differences in target fish catch or value For illuminated nets, bycatch probability per set was reduced by up to 74.4 % for sea turtles and 70.8 % for small cetaceans in comparison to non-illuminated, control nets. For seabirds, nominal BPUEs decreased by 84.0 % in the presence of LEDs. studies have reported an increase in bycatch of birds while using lights in the Baltic Sea where an increase in bycatch of long-tailed ducks was observed	can reduce bycatch of other protected species including fish (elasmobranch) , sea mammals and turtles		Senko et al., 2022 Bielli et al. 2020 ICES Technical Service advice, 2024 (Field et al. 2019) Almeida et al. 2023	**NO** but illuminating devices available on the market Fishtek marine	5
25. Visual deterrents / decoys	black and white patches in the net	Lithuania	not effective in reducing bycatch		requires additional carefulness, possible habituation	Birdlife International Almeida et al. 2023 HELCOM questionnaire	**NO**	6



Clean catch UK

Technical measures & net modification (static nets) – marine birds

Function: to scare away birds from the net/to make nets more visible/ altering soak time duration and timing to reduce bycatch risk of birds

Lights on the net (net illumination)

Visual deterrents / decoys

Predator shaped kites

Altering soak duration and timing, "Night setting"

Net modification, adding meshed panel

Colour netting

NOAA Fisheries

Reduced bycatch of species of concern (proven in the area of concern)

Reduced bycatch of species of concern (proven elsewhere)

Testing in progress, or results not conclusive

No reduction in bycatch

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- Alternative gears: preventing bycatch of marine mammals (harbour porpoise, seals) and birds

Alternative gears								
37. Cod pots as an alternative to gillnets **Flat fish pots**	makes depredation of nets by seals more difficult	Bay of Greifswald Denmark Sweden Denmark, Bornholm	Swedish trial has evaluated cod pots versus gillnets and long-lines in two areas in the south central Baltic Sea. The comparison showed that during the first half of the year the pot fishery generated lower daily catches than the gillnet and hook fisheries, while in the second half of the year pot catches exceeded or equalled the gillnet and hook catches. In addition to the time of the year, the pot catches varied according to soak-time, water depth, and current speed and direction. for the Bornholm area, higher catch rates were found in the winter and spring months compared to summer and autumn whether this is a recurring pattern is not possible to claim without a longer time series	reduces bycatch of birds and harbour porpoise significantly reduces the bycatch risk of harbour porpoise and birds	size of the catch depends on many conditions including time of the year, soak-time, water depth, fish density etc. very limited in terms of target species usually catch efficiency is lower than when catching with gillnets	Thuenen Institute of Baltic Sea Fisheries, Rostock Swedish SLU (Königson et al., 2015). (Kindt-Larsen et al., 2023) Kindt-Larsen, et al. 2022 HELCOM questionnaire	**YES**	**1**

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Alternative gears/net modification: mitigate bycatch of marine mammals (harbour porpoise, seals) and birds

Function: to prevent the entanglement of marine mammals and birds

Rafał Bocheński

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Cod pots

Flatfish pots

Pontoon traps

Hoovering ponton trap

Large fish trap

Fyke nets/fyke net modification (seal sock, seal protection device)

Reduced bycatch of species of concern (proven in the area of concern)

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- Operational measures (reduction of fishing effort) – all protected species

Operational measures								
Mitigation	**Function**	**Testing**	**Findings**	**Additional benefits**	**Limitations/considerations**	**Source**	**Availability to use**	**Mitigation effectiveness Status***
45. Reduction of soak time	reduction of fishing effort	Denmark Newfoundland and Labrador, Canada	bycatch reduction of sea mammals, birds and fish species target catch did not differ between control and short overnight sets but was greatly reduced during short daytime sets, seabird bycatch risk was highest when nets were full of catch (here, herring) and were left to soak throughout the day. shortening soak time reduced bird bycatch significantly	higher quality fish catch shorter soak time may reduce the risk of depredation by seals in the Baltic Sea	reduction of fishing effort A Shorter soak time than 24 hours would double the number of trips which possibly need to be compensated for	Glemarec et al., 2024 Collins et al., 2025	**YES**	**1**
46. Reduction of length/width of the gear	reduction of fishing effort		bycatch reduction of sea mammals, birds and fish species		reduction of fishing effort and catch	Read, 2021	**YES**	**1**

Non-lethal operational measures – reduction of fishing effort - all protected species

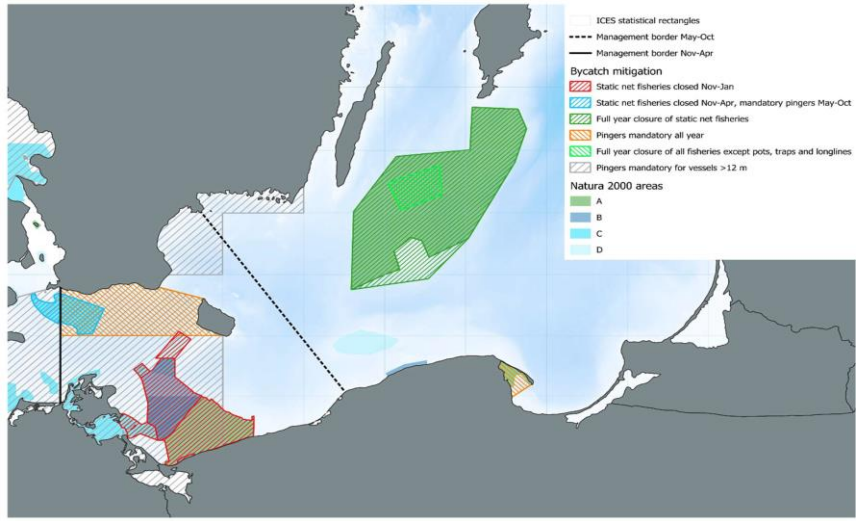
Reduction of soak time

Reduction of length/width of the gear

Seasonal area closures

Year-round area closures

Real time closures (RTC)



Reduced bycatch of species of concern (proven in the area of concern)

Reduced bycatch of animal group of concern, not proven for species of concern

Function: Fishing effort on static nets is reduced, so is bycatch of ETP species

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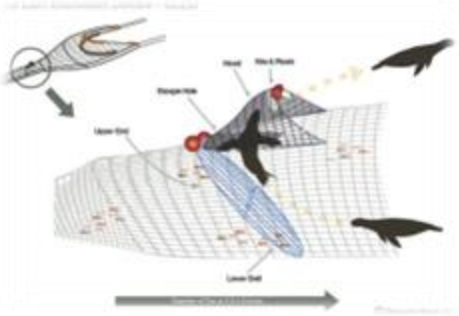
- Towed gears: alternative gear & net modification - bycatch reduction of protected species of sea mammals (seals, harbour porpoise)

Mitigation	Function	Testing	Findings	Additional benefits	Limitations/considerations	Source	Availability	Status*
Alternative gears								
52. Mini seine nets as alternative to gillnets	Can be used on smaller vessels has the potential to be used for species such as flounder, plaice, and turbot on soft bottoms in the Baltic, makes depredation of nets by seals more difficult.	Denmark Bornholm Great Belt and Germany	in summary the seine seems to be more suitable for catching the more valuable species, turbot and plaice, but catches of flounder are smaller mini-seine have the potential to compete with conventional fishing gears like gillnets, but are seal safe further test needed	reduces the risk of bycatch of harbour porpoises, birds, and seals	Seines require relatively soft and featureless sea bottoms, so the suitable fishing area might be smaller than that for gillnets, impact on the sea bottom	Kindt-Larsen et al., 2022 EU CIBBRiNA www.cibbrina.eu Thünen Institute 2024 HELCOM questionnaire	**NO**	**5**



Clean catch, UK

Towed (active) gears: alternative gear & net modification - bycatch reduction of protected species of sea mammals (seals, harbour porpoise).

Function: Reduce the risk of sea mammals entering the net

Mini seine nets as an alternative to gillnets

Escape tunnel along the bottom of the trawl

The excluder

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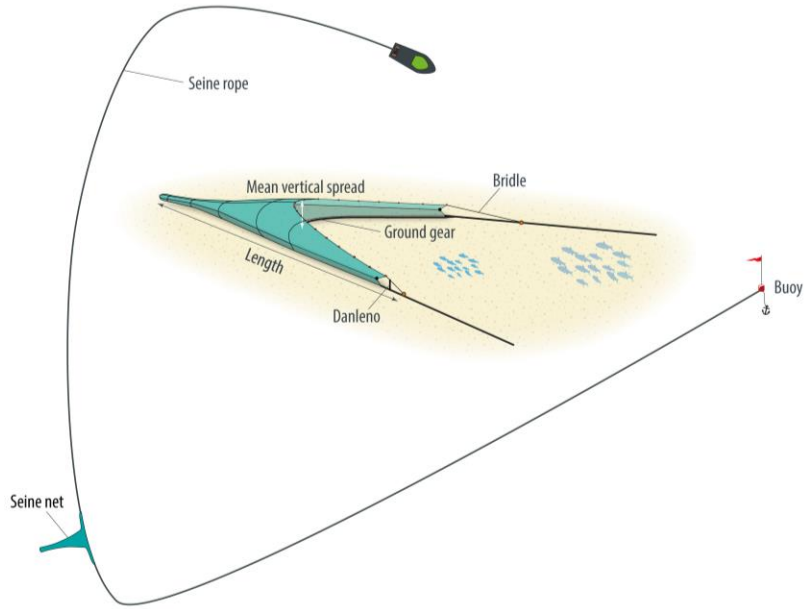

Reduced bycatch of animal group of concern, not proven for species of concern

Testing in progress, or results not conclusive

Conclusions

Species	Effective measures for bycatch mitigation (under certain conditions)
Harbour porpoise 	➢ **chosen types of pingers** (experimental (LU-1), banana pinger, wideband PAL 10-130 kHz, tonal PAL 10 kHz, Dunkane Netmark 1000), Aquatec Aquamark 1000 ➢ **alternative gears** (cod pots, pontoon traps, hoovering pontoon trap, large fish traps), ➢ **operational measures** (reduction of fishing effort temporal, year-round etc.), <u>but not real time closures (RTC)</u>.
Birds 	➢ **technical/operational measures** avoiding times of highest bird activity "Night setting", ➢ **operational measures** (reduction of fishing effort), <u>including real time closures (RTC)</u>, ➢ **alternative gears** (cod pots, pontoon traps, hoovering ponton trap, large fish trap).
Seals 	➢ **technical measures on fyke nets** seal sock, seal protection device, ➢ **alternative gears** (cod pots, pontoon traps, hoovering pontoon trap, large fish traps), ➢ **operational measures** (reduction of fishing effort), <u>but not real time closures (RTC).</u>